

CEOS and Constellations

MEST-NASA
Technical Group for GEO Atmospheric Composition
Measurements

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Washington, DC
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- **CEOS established in 1984 by the support of the G7 Economic Summit of Industrialized Nations Working Group on Growth, Technology and Employment.**
- **This group recognized the multidisciplinary nature of satellite Earth observation and the value of international coordination of space observations**
- **CEOS promotes international coordination of Earth observation programs**
 - **Forum to coordinate existing and planned mission**
 - **Establish data standards and exchange**
 - **Working groups for Cal/Val, Data standards, and Education**
 - **Six Constellations**
- **CEOS consists of 28 national space agencies (KARI) and 30 international science coordinating bodies with space components**
- **CEOS is taking the role of the space component of GEOSS**



- **Establish a framework for long term collaboration among the CEOS agencies** where the “Constellation” will identify specific opportunities for meeting science and application requirements
- **Collect and deliver data to improve predictive capabilities for coupled changes in the *Air Quality, Ozone Layer, and Climate Forcing*** associated with changes in the environment.
- **Objectives meet participating Agency priorities and are aligned to the GEO SBA’s (*Health, Climate, Energy, Ecosystems, Hazards*)**
- Objectives achieved through the following steps:
 - **Develop a Requirements and Gap Analysis** based on in-orbit and upcoming missions collecting AC data
 - Demonstrate how **Constellation data can add value** to data products serving the GEO SBA’s through **Projects**
 - Develop **rationale, strategy, and standards for collaboration** to meet requirements not being met and remain open for possible new requirements. **Collaborate on future missions**

Opportunity for conducting AC science and providing Societal Benefits using multiple instruments across international platforms

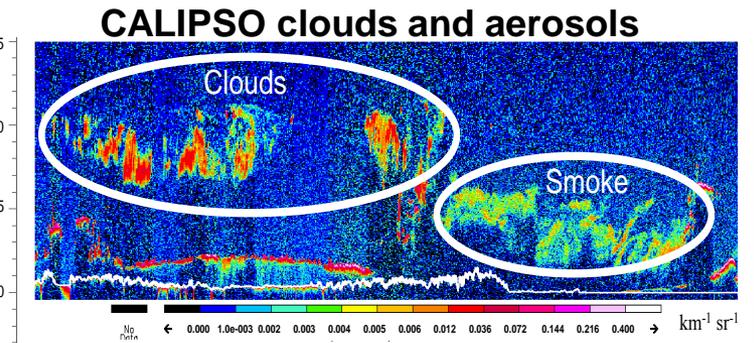
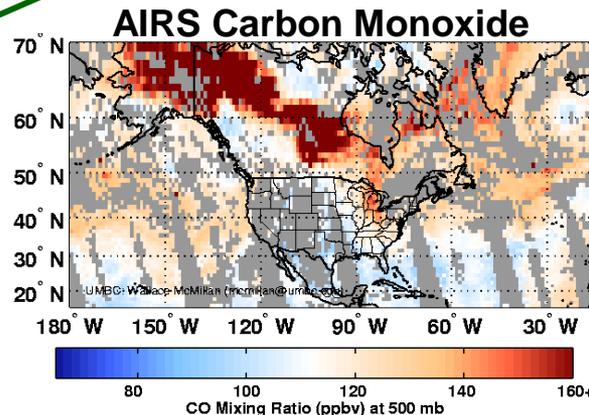
- Collaboration efficiency: take advantage of each instrument's unique capability
- Cross instrument validation
- Improved spatial and temporal coverage: e.g. different equator crossing times
- Enhanced data products: e.g. aerosol and cloud characteristics, pollution and its transport for assessments and forecasting
- *More accurate trends by comparing and combining data sets*



A-train is a good example of Constellation Science

CEOS provides an opportunity to extend collaboration internationally

Example:
Geographic extent of CO from biomass burning in combination with vertical distribution of smoke improves assessment of total emissions and downstream impacts



- **Four Workshops with Three reports**
 - Missions - Requirements and Gap Analysis
 - Climate - Data Gap Impact on Climate Models
 - Air Quality – Capabilities and Applications




CEOS Atmospheric Composition Constellation

Gap Analysis Study

Final Report
Version 1
November 2008

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Space Science & Technology

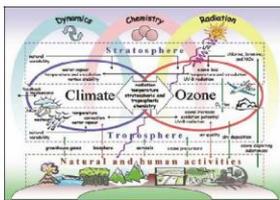






Report of the Atmospheric Composition Constellation Workshop on the Impact of Data Gaps on Climate Modeling Validation and Forecasts

Recommendations to the CEOS Agencies



Goddard Institute for Space Studies
October 15-17, 2008







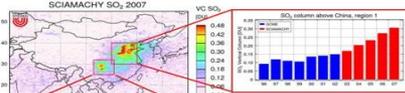




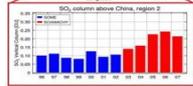





Report of the Committee on Earth Observation Satellites (CEOS) Atmospheric Composition Constellation (ACC) Workshop on Air Quality

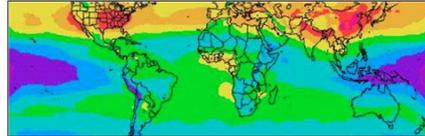


SCIAMACHY SO₂ 2007



SO₂ Trend Analysis in China - University Bremen

Tropospheric Ozone - NASA



Hosted by ESA-ESRIN
Frascati, Italy
June 15-17, 2009













- **ACC Air Quality Workshop held at ESA/ESRIN in June 2009 with 45 international Earth science and applications investigators and users**
 - Data quality from existing LEO missions
 - Recent applications for forecasting, assessment and trends
 - Identify future requirements based on planned missions
- **Recommendations:**
 - **Coordinate a future Air Quality Constellation based on geostationary satellites planned by Korean (GEMS), ESA (Sentinel-4), NASA (GEO-CAPE), and the Japanese Geostationary Atmospheric Observation Satellite.**
 - **All are expected to be launched in the period 2018-2026.**
 - **Take advantage of their synergistic capabilities.**
 - **Cost efficiencies through common instrument requirements.**
 - **Coordinated algorithm development, data content and format, and cal/val should be planned.**
 - **Coordinate with LEO missions resulting in a true Air Quality Constellation**